

FIG. 1

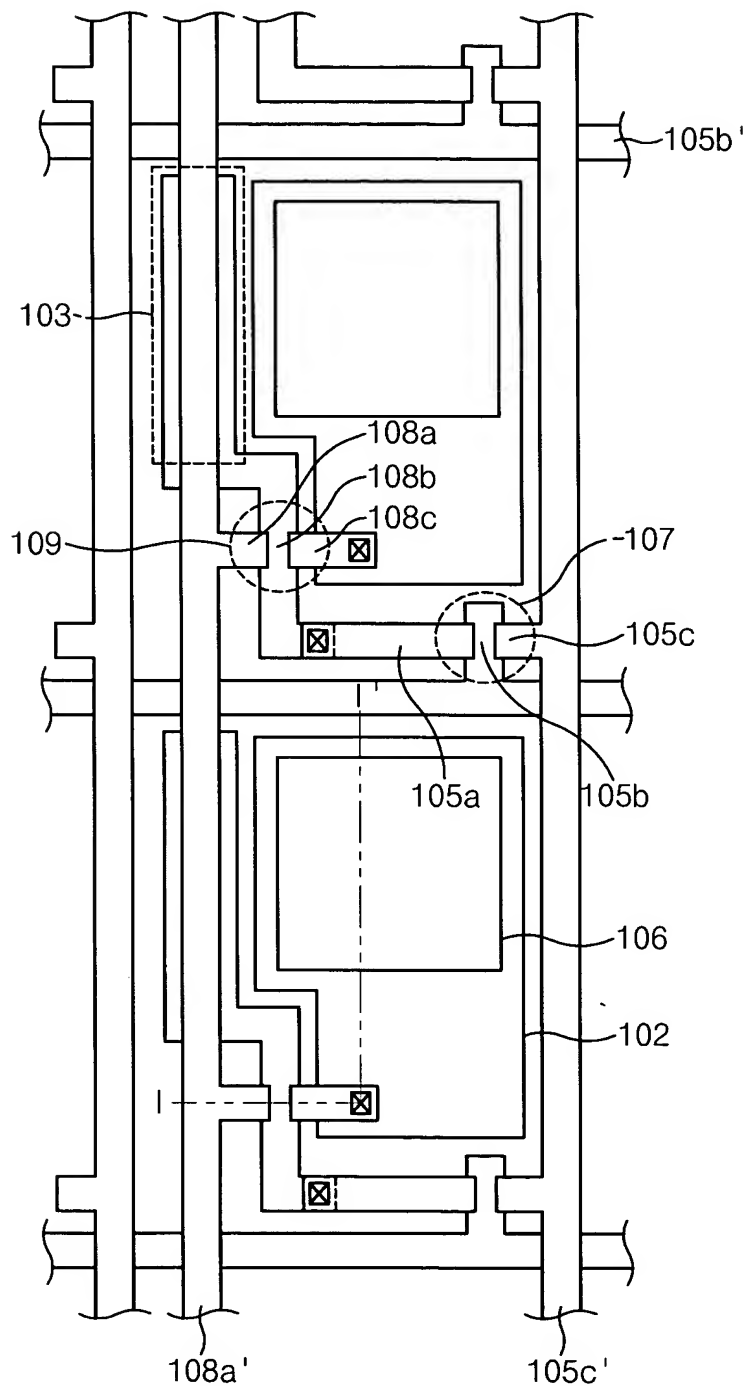


FIG. 2

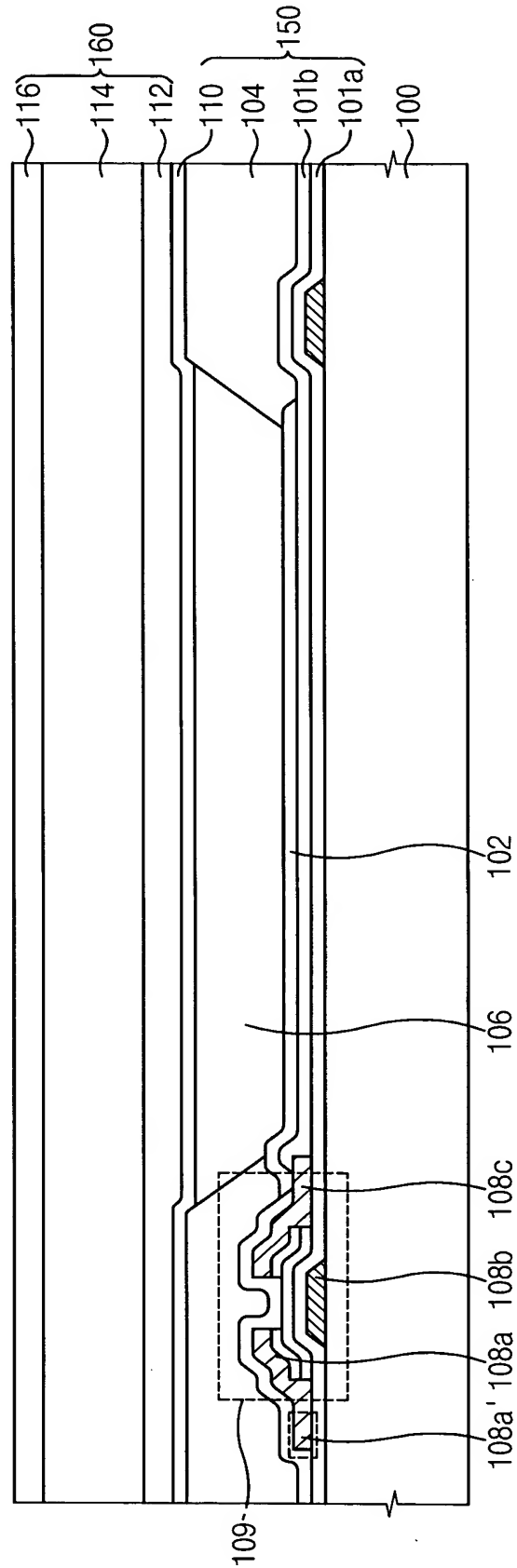


FIG. 3

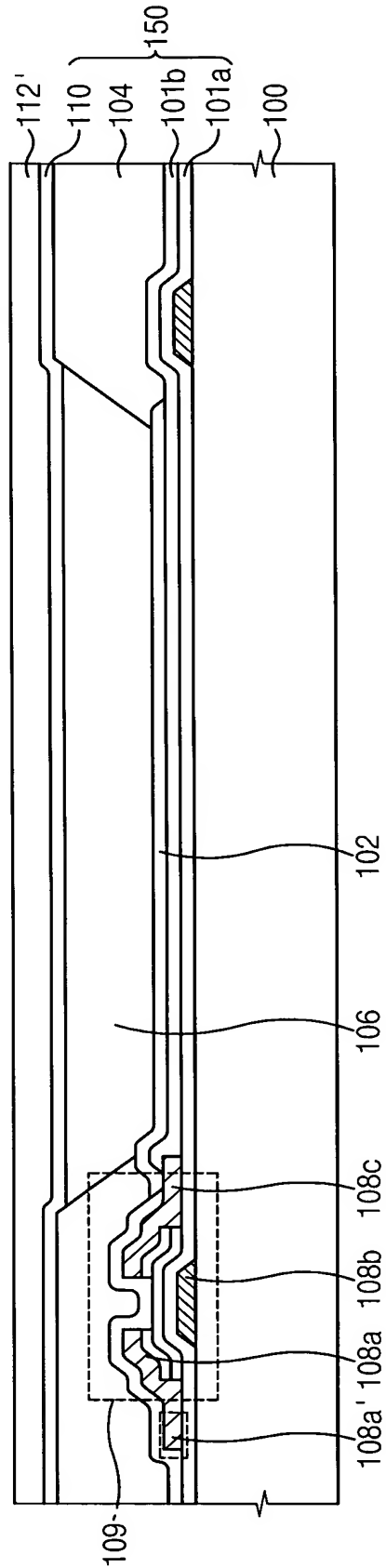


FIG. 4

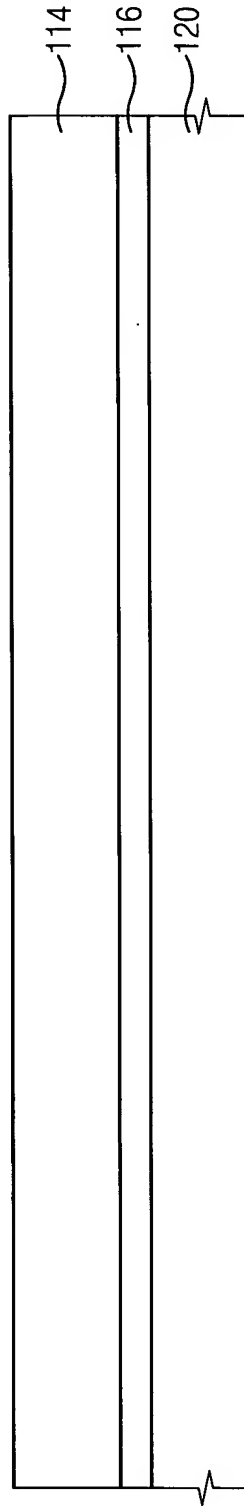


FIG. 5

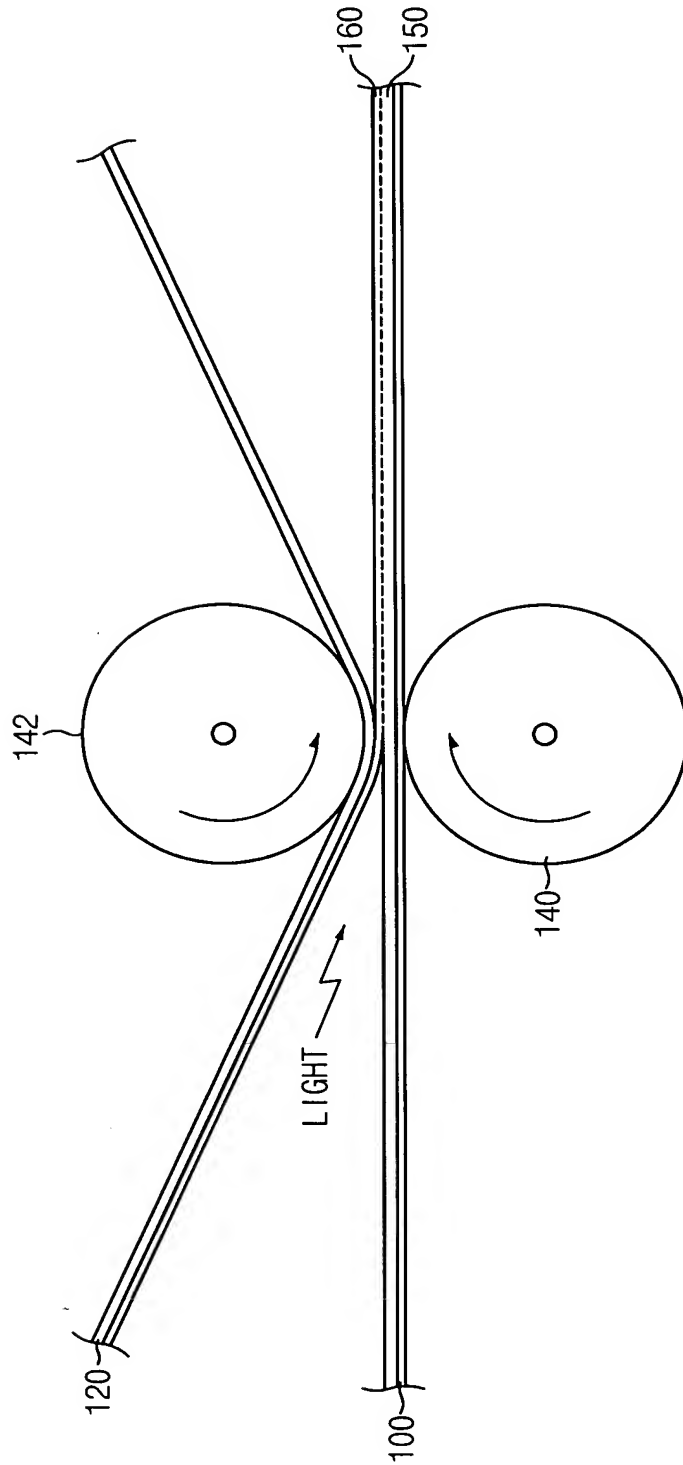


FIG. 6

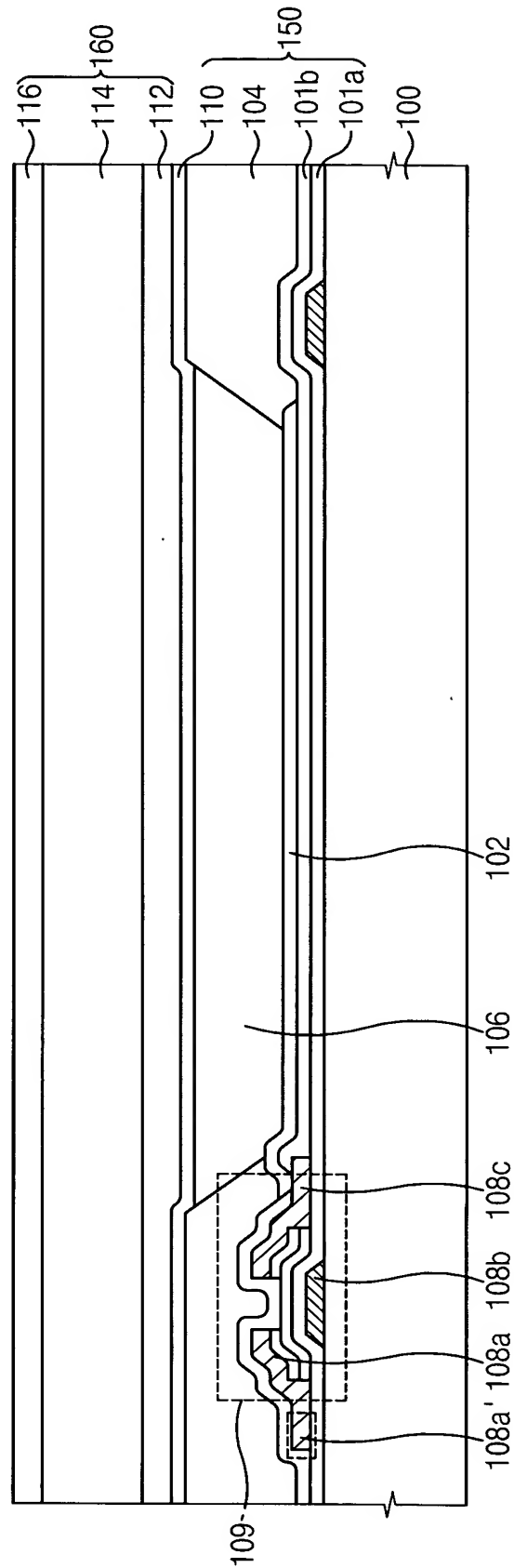


FIG. 7

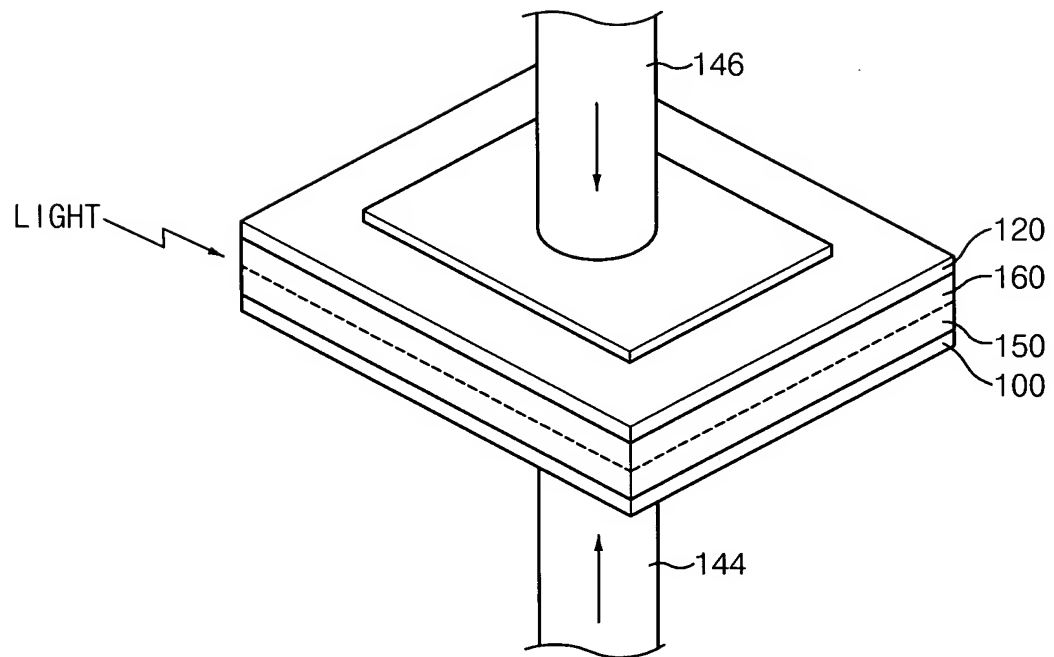
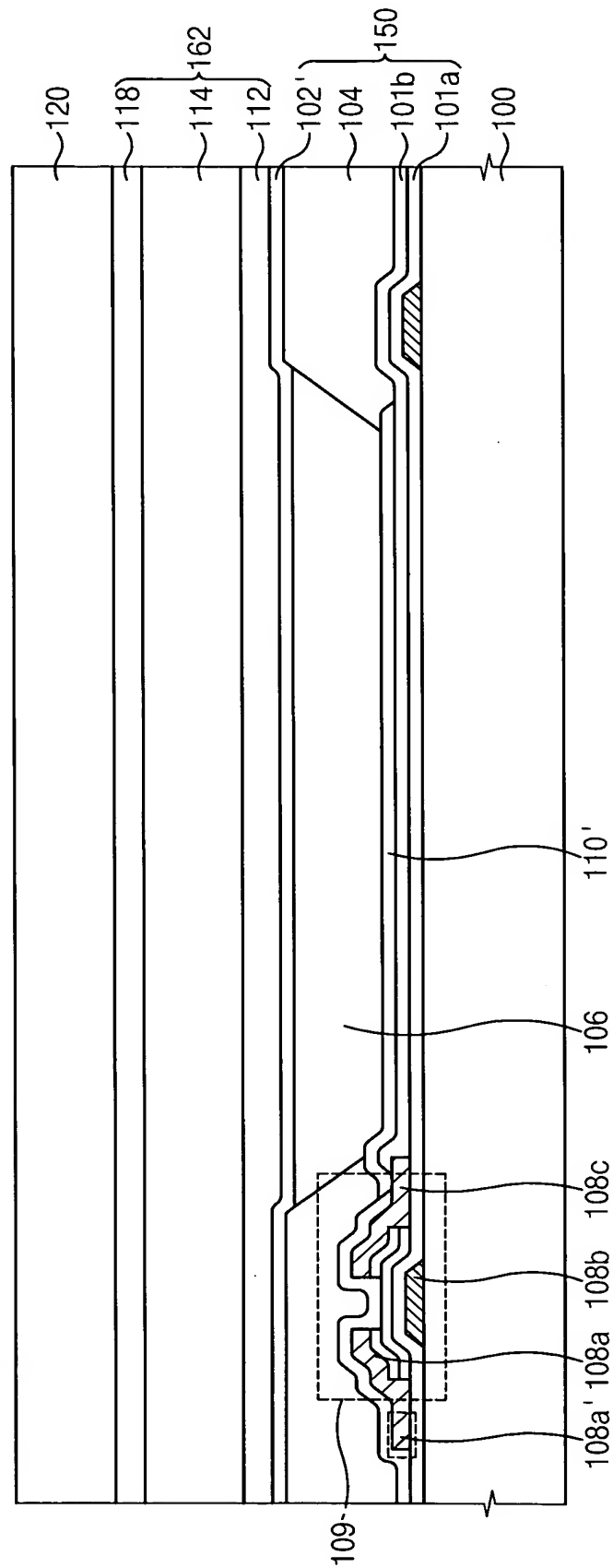


FIG. 8





This cross-sectional view shows a semiconductor device with a substrate 100. A trench 101 is formed in the substrate, with its bottom surface 101a and side surface 101b. A first conductive layer 102 is deposited on the bottom surface 101a and side surface 101b. A second conductive layer 104 is deposited on top of the first conductive layer 102. A third conductive layer 106 is deposited on top of the second conductive layer 104. A fourth conductive layer 108 is deposited on top of the third conductive layer 106. A fifth conductive layer 110 is deposited on top of the fourth conductive layer 108. A sixth conductive layer 112 is deposited on top of the fifth conductive layer 110. A seventh conductive layer 114 is deposited on top of the sixth conductive layer 112. A eighth conductive layer 116 is deposited on top of the seventh conductive layer 114. A ninth conductive layer 118 is deposited on top of the eighth conductive layer 116. A tenth conductive layer 120 is deposited on top of the ninth conductive layer 118. A eleventh conductive layer 122 is deposited on top of the tenth conductive layer 120. A twelfth conductive layer 124 is deposited on top of the eleventh conductive layer 122. A thirteenth conductive layer 126 is deposited on top of the twelfth conductive layer 124. A fourteenth conductive layer 128 is deposited on top of the thirteenth conductive layer 126. A fifteenth conductive layer 130 is deposited on top of the fourteenth conductive layer 128. A sixteenth conductive layer 132 is deposited on top of the fifteenth conductive layer 130. A seventeenth conductive layer 134 is deposited on top of the sixteenth conductive layer 132. An eighteenth conductive layer 136 is deposited on top of the seventeenth conductive layer 134. A nineteenth conductive layer 138 is deposited on top of the eighteenth conductive layer 136. A twentieth conductive layer 140 is deposited on top of the nineteenth conductive layer 138. A twenty-first conductive layer 142 is deposited on top of the twentieth conductive layer 140. A twenty-second conductive layer 144 is deposited on top of the twenty-first conductive layer 142. A twenty-third conductive layer 146 is deposited on top of the twenty-second conductive layer 144. A twenty-fourth conductive layer 148 is deposited on top of the twenty-third conductive layer 146. A twenty-fifth conductive layer 150 is deposited on top of the twenty-fourth conductive layer 148. A twenty-sixth conductive layer 152 is deposited on top of the twenty-fifth conductive layer 150. A twenty-seventh conductive layer 154 is deposited on top of the twenty-sixth conductive layer 152. A twenty-eighth conductive layer 156 is deposited on top of the twenty-seventh conductive layer 154. A twenty-ninth conductive layer 158 is deposited on top of the twenty-eighth conductive layer 156. A thirtieth conductive layer 160 is deposited on top of the twenty-ninth conductive layer 158. A thirty-first conductive layer 162 is deposited on top of the thirtieth conductive layer 160. A thirty-second conductive layer 164 is deposited on top of the thirty-first conductive layer 162. A thirty-third conductive layer 166 is deposited on top of the thirty-second conductive layer 164. A thirty-fourth conductive layer 168 is deposited on top of the thirty-third conductive layer 166. A thirty-fifth conductive layer 170 is deposited on top of the thirty-fourth conductive layer 168. A thirty-sixth conductive layer 172 is deposited on top of the thirty-fifth conductive layer 170. A thirty-seventh conductive layer 174 is deposited on top of the thirty-sixth conductive layer 172. A thirty-eighth conductive layer 176 is deposited on top of the thirty-seventh conductive layer 174. A thirty-ninth conductive layer 178 is deposited on top of the thirty-eighth conductive layer 176. A fortieth conductive layer 180 is deposited on top of the thirty-ninth conductive layer 178. A forty-first conductive layer 182 is deposited on top of the fortieth conductive layer 180. A forty-second conductive layer 184 is deposited on top of the forty-first conductive layer 182. A forty-third conductive layer 186 is deposited on top of the forty-second conductive layer 184. A forty-fourth conductive layer 188 is deposited on top of the forty-third conductive layer 186. A forty-fifth conductive layer 190 is deposited on top of the forty-fourth conductive layer 188. A forty-sixth conductive layer 192 is deposited on top of the forty-fifth conductive layer 190. A forty-seventh conductive layer 194 is deposited on top of the forty-sixth conductive layer 192. A forty-eighth conductive layer 196 is deposited on top of the forty-seventh conductive layer 194. A forty-ninth conductive layer 198 is deposited on top of the forty-eighth conductive layer 196. A fiftieth conductive layer 200 is deposited on top of the forty-ninth conductive layer 198. A fifty-first conductive layer 202 is deposited on top of the fiftieth conductive layer 200. A fifty-second conductive layer 204 is deposited on top of the fifty-first conductive layer 202. A fifty-third conductive layer 206 is deposited on top of the fifty-second conductive layer 204. A fifty-fourth conductive layer 208 is deposited on top of the fifty-third conductive layer 206. A fifty-fifth conductive layer 210 is deposited on top of the fifty-fourth conductive layer 208. A fifty-sixth conductive layer 212 is deposited on top of the fifty-fifth conductive layer 210. A fifty-seventh conductive layer 214 is deposited on top of the fifty-sixth conductive layer 212. A fifty-eighth conductive layer 216 is deposited on top of the fifty-seventh conductive layer 214. A fifty-ninth conductive layer 218 is deposited on top of the fifty-eighth conductive layer 216. A sixtieth conductive layer 220 is deposited on top of the fifty-ninth conductive layer 218. A sixty-first conductive layer 222 is deposited on top of the sixtyth conductive layer 220. A sixty-second conductive layer 224 is deposited on top of the sixty-first conductive layer 222. A sixty-third conductive layer 226 is deposited on top of the sixty-second conductive layer 224. A sixty-fourth conductive layer 228 is deposited on top of the sixty-third conductive layer 226. A sixty-fifth conductive layer 230 is deposited on top of the sixty-fourth conductive layer 228. A sixty-sixth conductive layer 232 is deposited on top of the sixty-fifth conductive layer 230. A sixty-seventh conductive layer 234 is deposited on top of the sixty-sixth conductive layer 232. A sixty-eighth conductive layer 236 is deposited on top of the sixty-seventh conductive layer 234. A sixty-ninth conductive layer 238 is deposited on top of the sixty-eighth conductive layer 236. A seventieth conductive layer 240 is deposited on top of the sixty-ninth conductive layer 238. A seventy-first conductive layer 242 is deposited on top of the seventieth conductive layer 240. A seventy-second conductive layer 244 is deposited on top of the seventy-first conductive layer 242. A seventy-third conductive layer 246 is deposited on top of the seventy-second conductive layer 244. A seventy-fourth conductive layer 248 is deposited on top of the seventy-third conductive layer 246. A seventy-fifth conductive layer 250 is deposited on top of the seventy-fourth conductive layer 248. A seventy-sixth conductive layer 252 is deposited on top of the seventy-fifth conductive layer 250. A seventy-seventh conductive layer 254 is deposited on top of the seventy-sixth conductive layer 252. A seventy-eighth conductive layer 256 is deposited on top of the seventy-seventh conductive layer 254. A seventy-ninth conductive layer 258 is deposited on top of the seventy-eighth conductive layer 256. An eightieth conductive layer 260 is deposited on top of the seventy-ninth conductive layer 258. An eighty-first conductive layer 262 is deposited on top of the eightyth conductive layer 260. An eighty-second conductive layer 264 is deposited on top of the eighty-first conductive layer 262. An eighty-third conductive layer 266 is deposited on top of the eighty-second conductive layer 264. An eighty-fourth conductive layer 268 is deposited on top of the eighty-third conductive layer 266. An eighty-fifth conductive layer 270 is deposited on top of the eighty-fourth conductive layer 268. An eighty-sixth conductive layer 272 is deposited on top of the eighty-fifth conductive layer 270. An eighty-seventh conductive layer 274 is deposited on top of the eighty-sixth conductive layer 272. An eighty-eighth conductive layer 276 is deposited on top of the eighty-seventh conductive layer 274. An eighty-ninth conductive layer 278 is deposited on top of the eighty-eighth conductive layer 276. A ninetieth conductive layer 280 is deposited on top of the eighty-ninth conductive layer 278. A hundredth conductive layer 282 is deposited on top of the ninetieth conductive layer 280. A hundred-first conductive layer 284 is deposited on top of the hundredth conductive layer 282. A hundred-second conductive layer 286 is deposited on top of the hundred-first conductive layer 284. A hundred-third conductive layer 288 is deposited on top of the hundred-second conductive layer 286. A hundred-fourth conductive layer 290 is deposited on top of the hundred-third conductive layer 288. A hundred-fifth conductive layer 292 is deposited on top of the hundred-fourth conductive layer 290. A hundred-sixth conductive layer 294 is deposited on top of the hundred-fifth conductive layer 292. A hundred-seventh conductive layer 296 is deposited on top of the hundred-sixth conductive layer 294. A hundred-eighth conductive layer 298 is deposited on top of the hundred-seventh conductive layer 296. A hundred-ninth conductive layer 300 is deposited on top of the hundred-eighth conductive layer 298. A hundred-tenth conductive layer 302 is deposited on top of the hundred-ninth conductive layer 300. A hundred-eleventh conductive layer 304 is deposited on top of the hundred-tenth conductive layer 302. A hundred-twelfth conductive layer 306 is deposited on top of the hundred-eleventh conductive layer 304. A hundred-thirteenth conductive layer 308 is deposited on top of the hundred-twelfth conductive layer 306. A hundred-fourteenth conductive layer 310 is deposited on top of the hundred-thirteenth conductive layer 308. A hundred-fifteenth conductive layer 312 is deposited on top of the hundred-fourteenth conductive layer 310. A hundred-sixteenth conductive layer 314 is deposited on top of the hundred-fifteenth conductive layer 312. A hundred-seventeenth conductive layer 316 is deposited on top of the hundred-sixteenth conductive layer 314. A hundred-eighteenth conductive layer 318 is deposited on top of the hundred-seventeenth conductive layer 316. A hundred-nineteenth conductive layer 320 is deposited on top of the hundred-eighteenth conductive layer 318. A hundred-twentieth conductive layer 322 is deposited on top of the hundred-nineteenth conductive layer 320. A hundred-twenty-first conductive layer 324 is deposited on top of the hundred-twentieth conductive layer 322. A hundred-twenty-second conductive layer 326 is deposited on top of the hundred-twenty-first conductive layer 324. A hundred-twenty-third conductive layer 328 is deposited on top of the hundred-twenty-second conductive layer 326. A hundred-twenty-fourth conductive layer 330 is deposited on top of the hundred-twenty-third conductive layer 328. A hundred-twenty-fifth conductive layer 332 is deposited on top of the hundred-twenty-fourth conductive layer 330. A hundred-twenty-sixth conductive layer 334 is deposited on top of the hundred-twenty-fifth conductive layer 332. A hundred-twenty-seventh conductive layer 336 is deposited on top of the hundred-twenty-sixth conductive layer 334. A hundred-twenty-eighth conductive layer 338 is deposited on top of the hundred-twenty-seventh conductive layer 336. A hundred-twenty-ninth conductive layer 340 is deposited on top of the hundred-twenty-eighth conductive layer 338. A hundred-thirtieth conductive layer 342 is deposited on top of the hundred-twenty-ninth conductive layer 340. A hundred-thirty-first conductive layer 344 is deposited on top of the hundred-thirtieth conductive layer 342. A hundred-thirty-second conductive layer 346 is deposited on top of the hundred-thirty-first conductive layer 344. A hundred-thirty-third conductive layer 348 is deposited on top of the hundred-thirty-second conductive layer 346. A hundred-thirty-fourth conductive layer 350 is deposited on top of the hundred-thirty-third conductive layer 348. A hundred-thirty-fifth conductive layer 352 is deposited on top of the hundred-thirty-fourth conductive layer 350. A hundred-thirty-sixth conductive layer 354 is deposited on top of the hundred-thirty-fifth conductive layer 352. A hundred-thirty-seventh conductive layer 356 is deposited on top of the hundred-thirty-sixth conductive layer 354. A hundred-thirty-eighth conductive layer 358 is deposited on top of the hundred-thirty-seventh conductive layer 356. A hundred-thirty-ninth conductive layer 360 is deposited on top of the hundred-thirty-eighth conductive layer 358. A hundred-fortieth conductive layer 362 is deposited on top of the hundred-thirty-ninth conductive layer 360. A hundred-forty-first conductive layer 364 is deposited on top of the hundred-fortieth conductive layer 362. A hundred-forty-second conductive layer 366 is deposited on top of the hundred-forty-first conductive layer 364. A hundred-forty-third conductive layer 368 is deposited on top of the hundred-forty-second conductive layer 366. A hundred-forty-fourth conductive layer 370 is deposited on top of the hundred-forty-third conductive layer 368. A hundred-forty-fifth conductive layer 372 is deposited on top of the hundred-forty-fourth conductive layer 370. A hundred-forty-sixth conductive layer 374 is deposited on top of the hundred-forty-fifth conductive layer 372. A hundred-forty-seventh conductive layer 376 is deposited on top of the hundred-forty-sixth conductive layer 374. A hundred-forty-eighth conductive layer 378 is deposited on top of the hundred-forty-seventh conductive layer 376. A hundred-forty-ninth conductive layer 380 is deposited on top of the hundred-forty-eighth conductive layer 378. A hundred-fiftieth conductive layer 382 is deposited on top of the hundred-forty-ninth conductive layer 380. A hundred-fifty-first conductive layer 384 is deposited on top of the hundred-fiftieth conductive layer 382. A hundred-fifty-second conductive layer 386 is deposited on top of the hundred-fifty-first conductive layer 384. A hundred-fifty-third conductive layer 3

FIG. 10

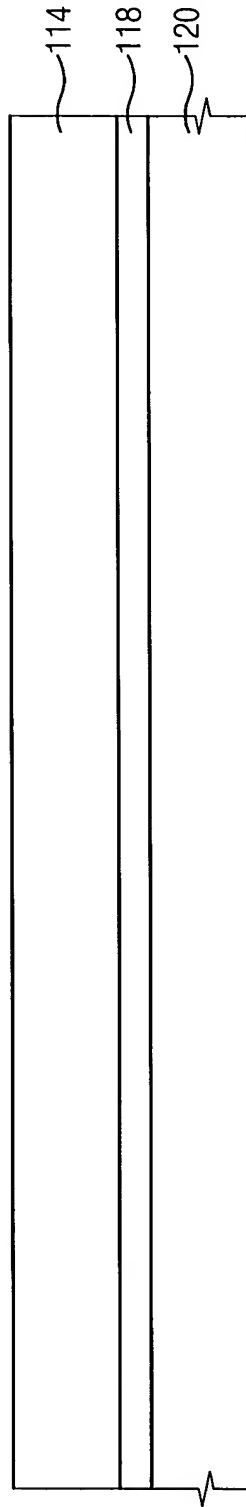
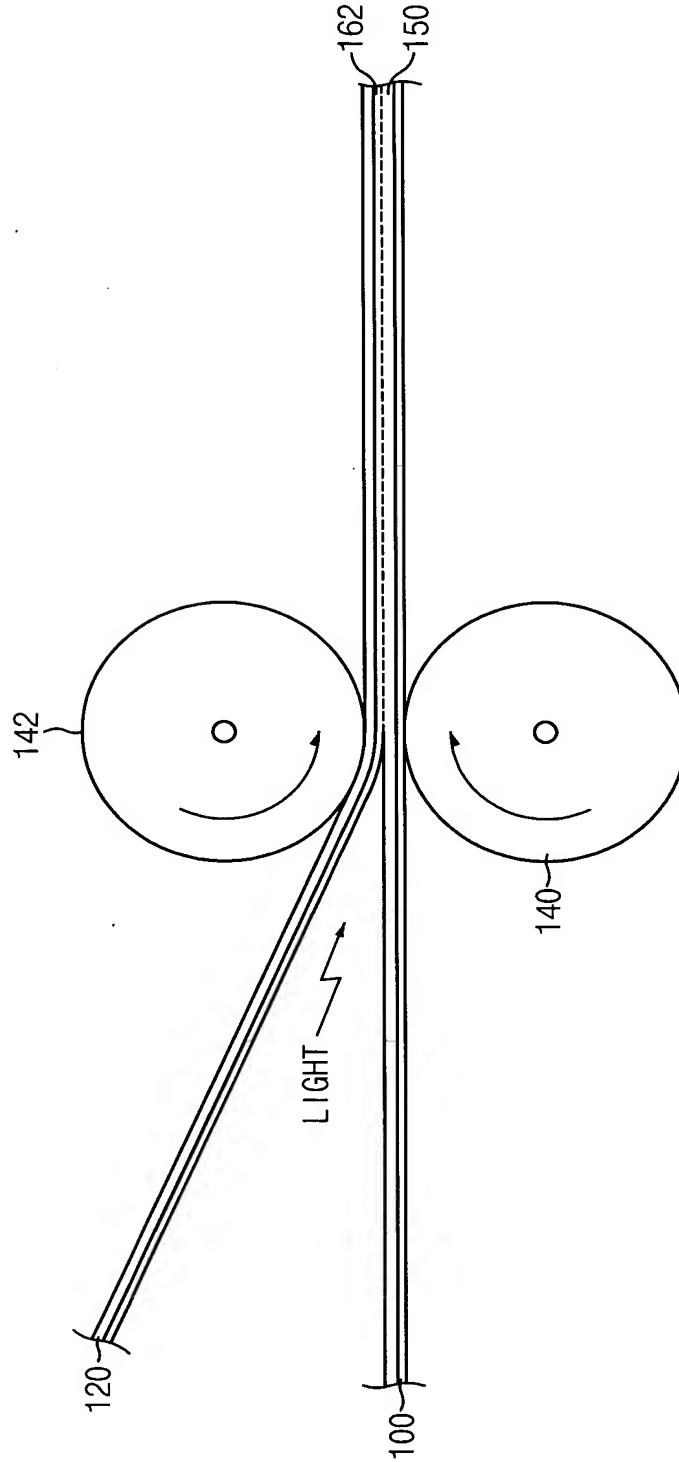


FIG. 11



[illegible]

FIG. 13

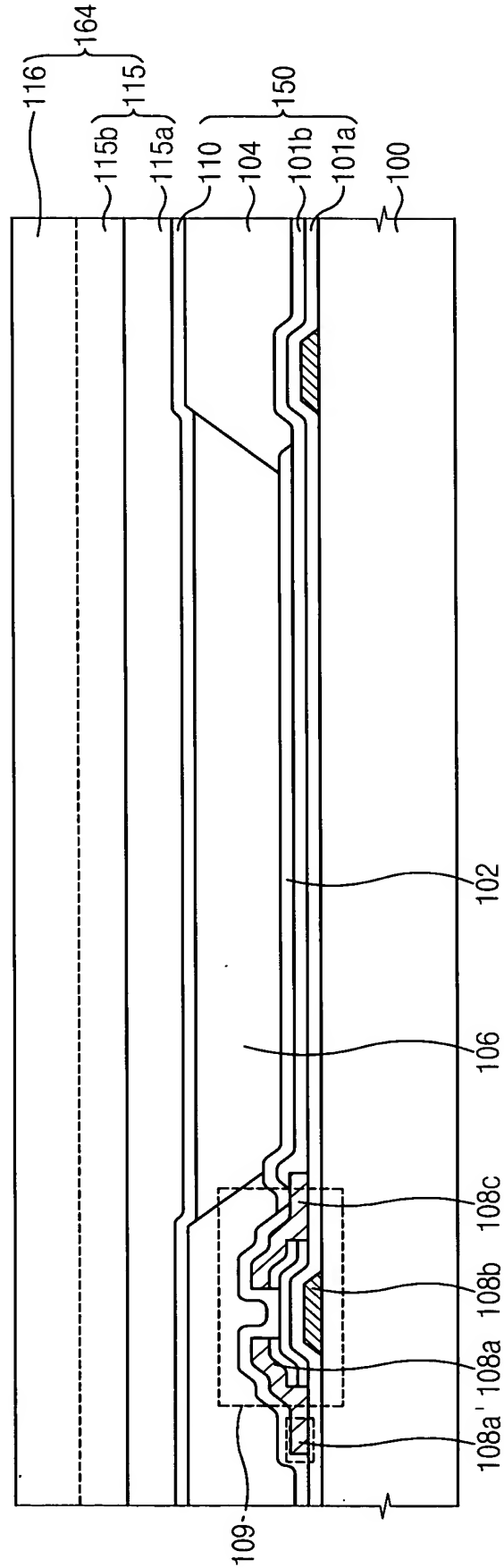


FIG. 14

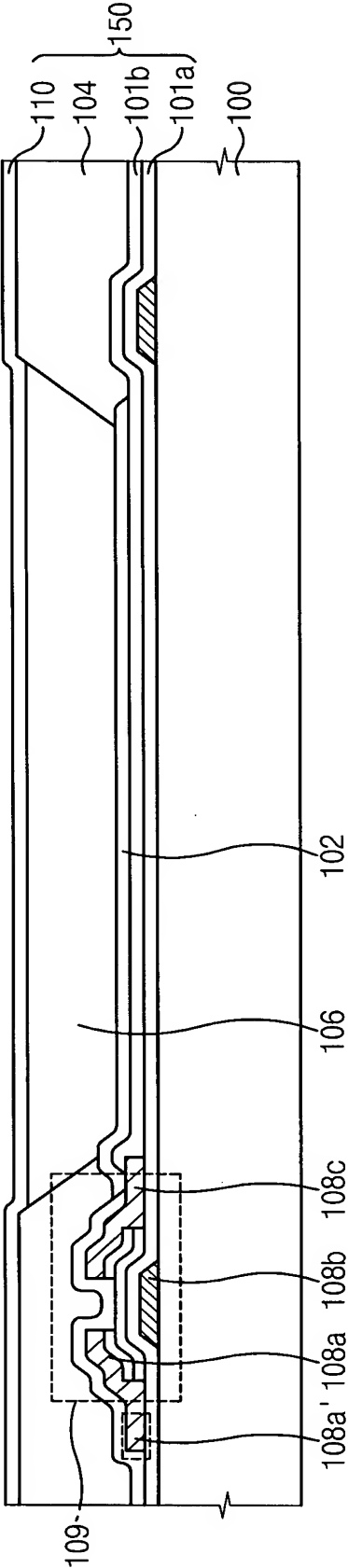


FIG. 15

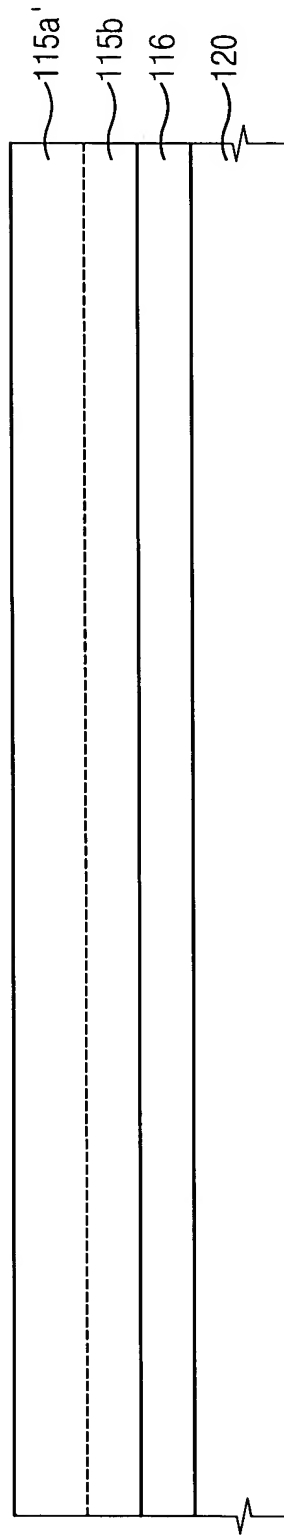
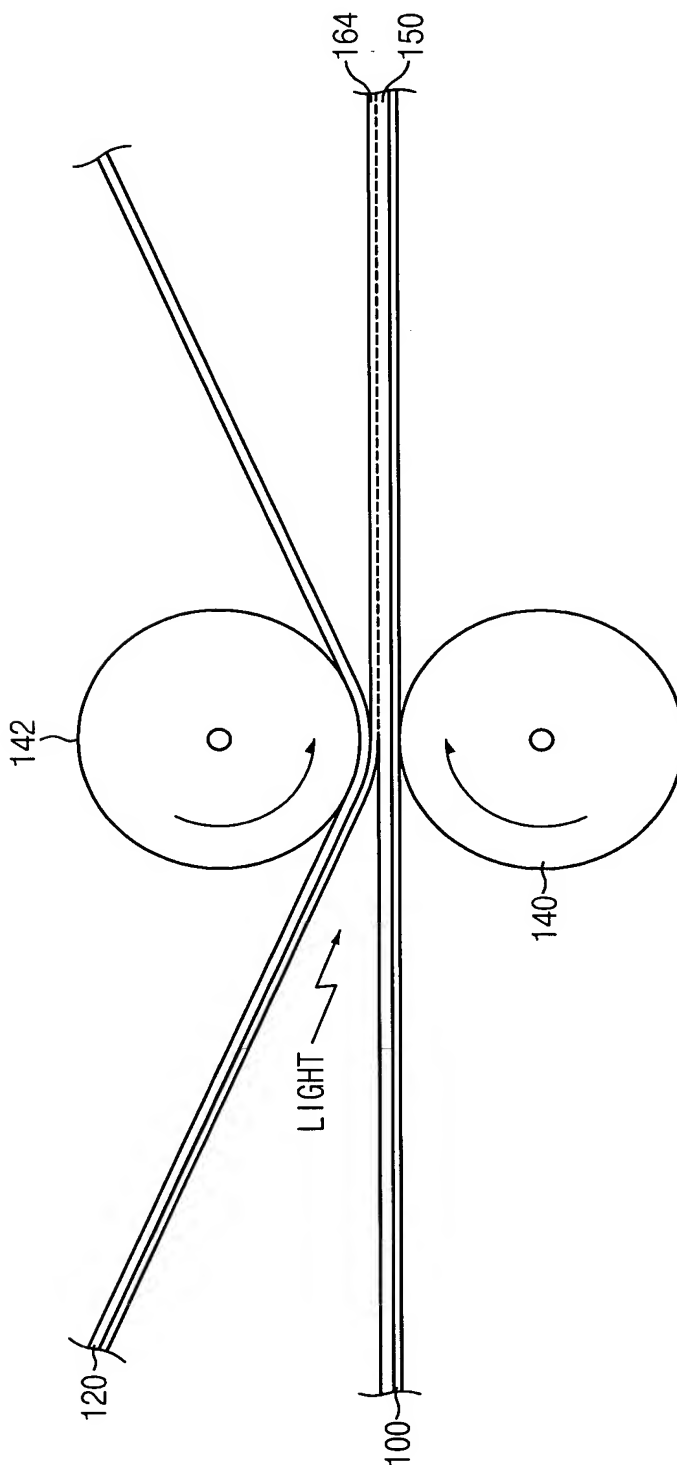


FIG. 16





This diagram shows a cross-sectional view of a semiconductor device. The structure consists of several layers and features. At the top, there is a layer labeled 116, which is part of a group 164. Below this is a layer 115b, also part of group 164. A dashed line indicates a boundary or interface. Below the dashed line is a layer 115a, which is part of a group 115. This is followed by a layer 110. Below layer 110 is a layer 104. Below layer 104 is a layer 101b, which is part of a group 150. Below layer 101b is a layer 101a. The bottom-most layer is labeled 100. On the right side, there is a vertical line labeled 102. Below this line, there is a series of labels: 106, 108c, 108b, 108a, and 108a'. A dashed box labeled 109 encloses a portion of the structure, including layers 110, 104, 101b, and 101a. A hatched area is shown within the dashed box 109, located between layers 101b and 101a. A break symbol is shown at the bottom right of the diagram.

FIG. 18

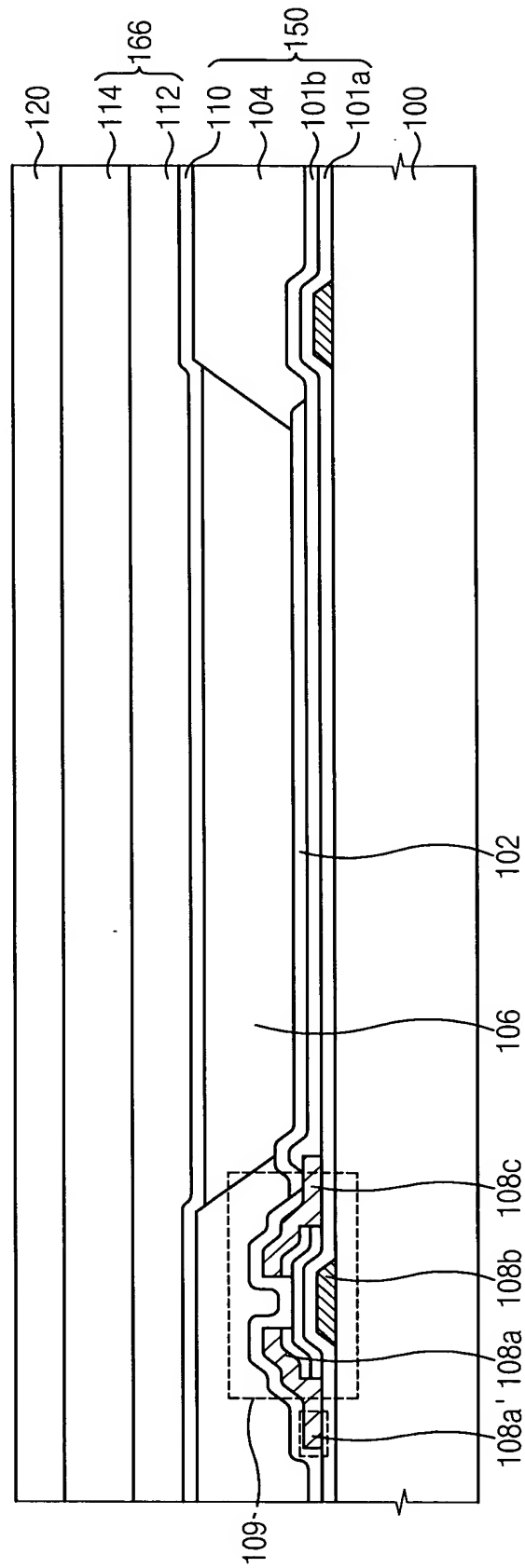


FIG. 19

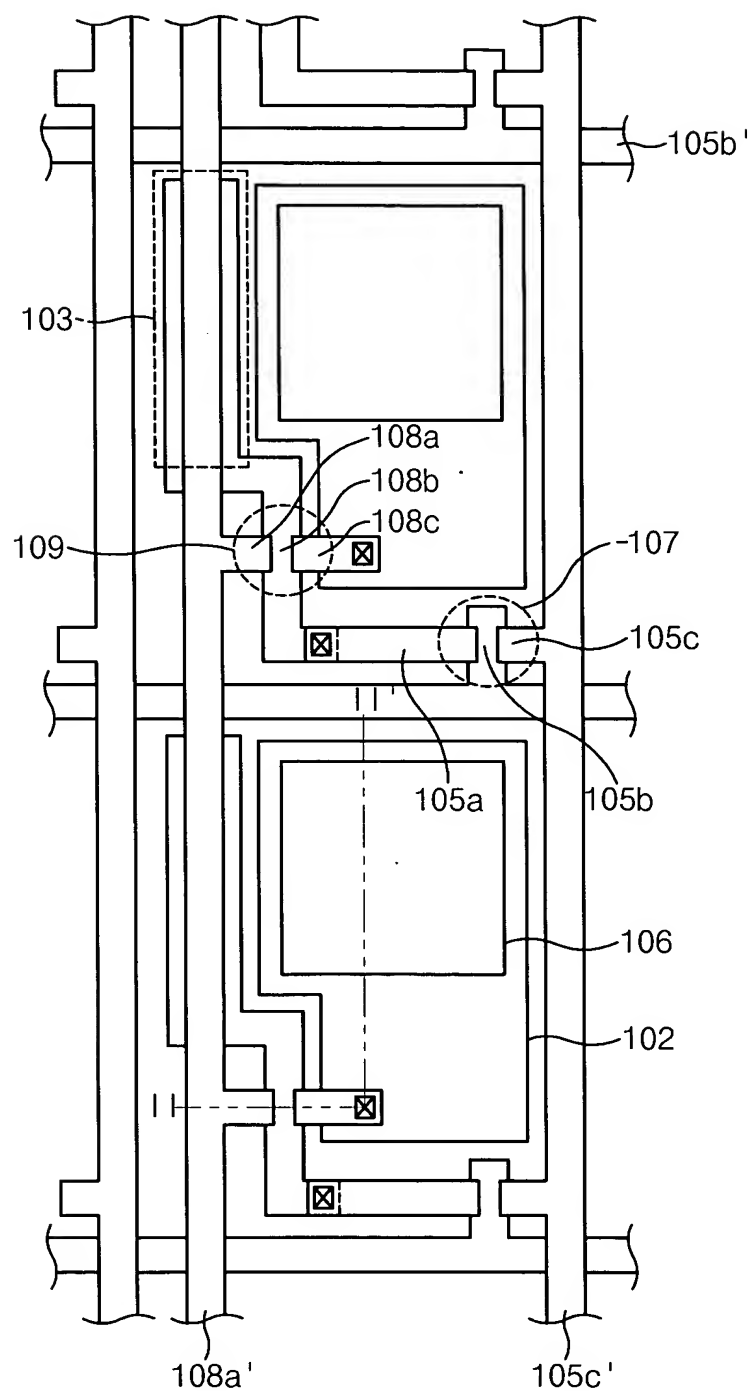


FIG. 20

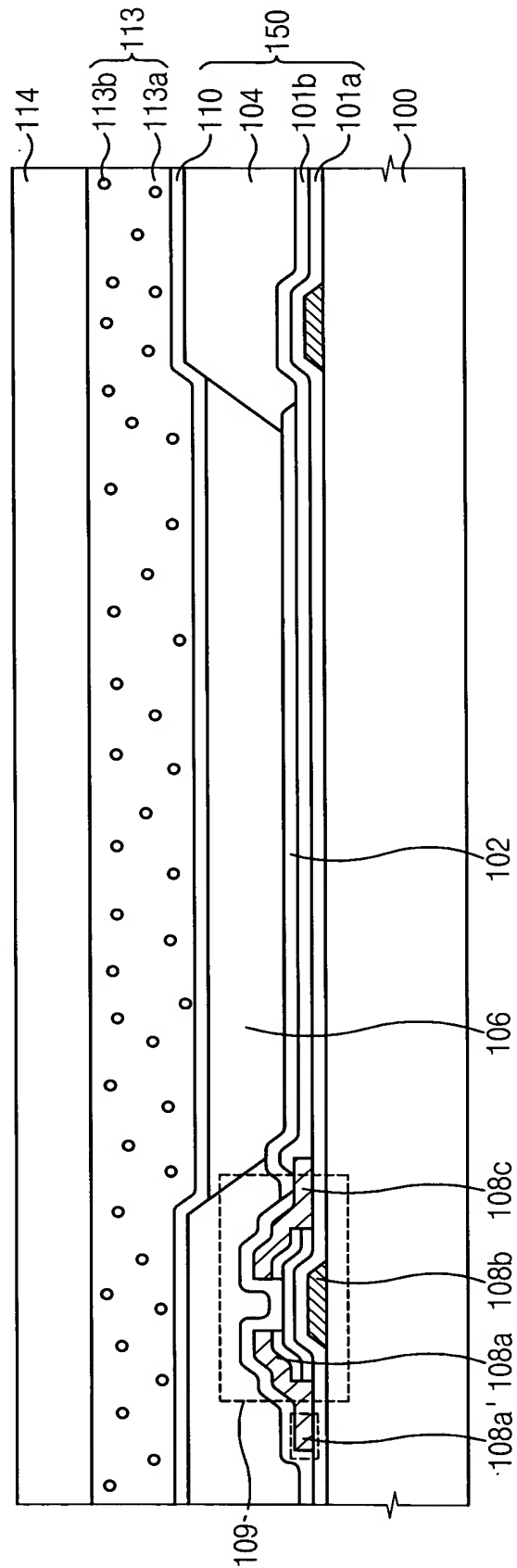


FIG. 21

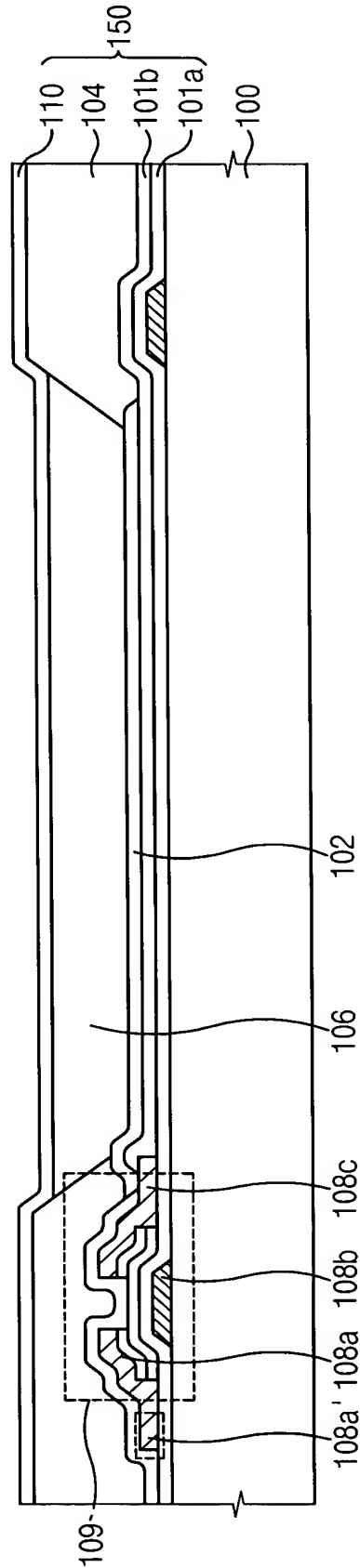


FIG. 22

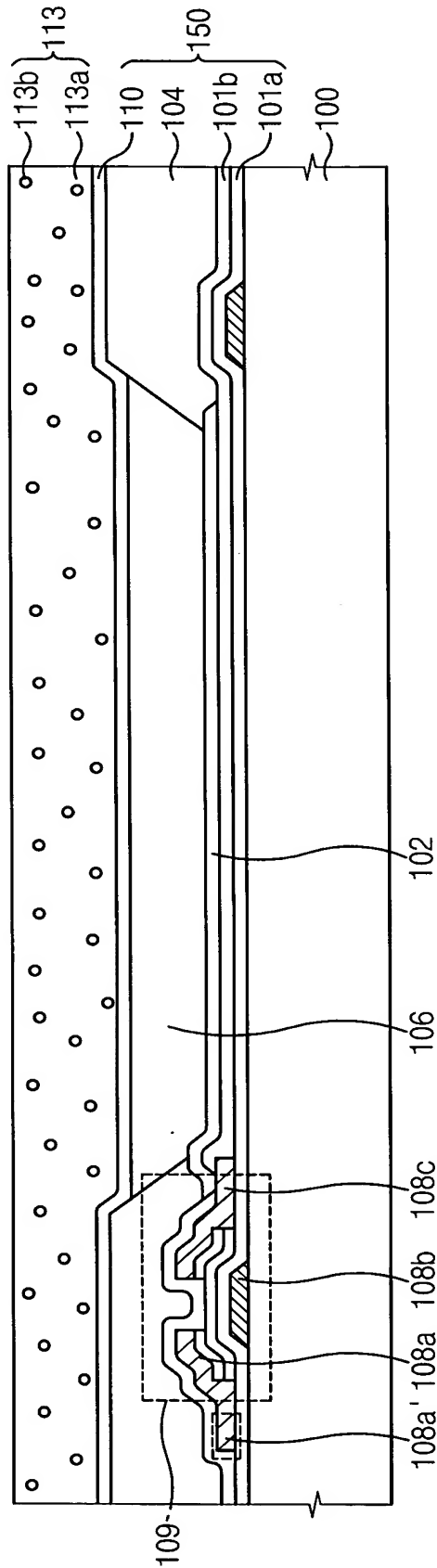




FIG. 24

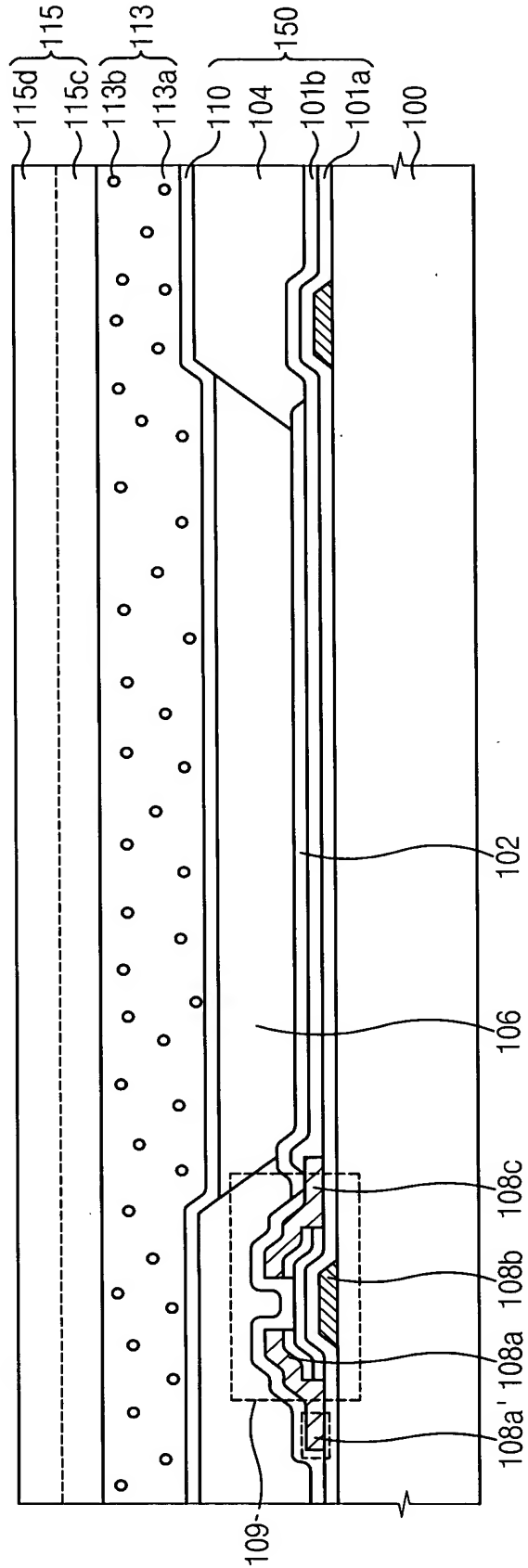




FIG. 25

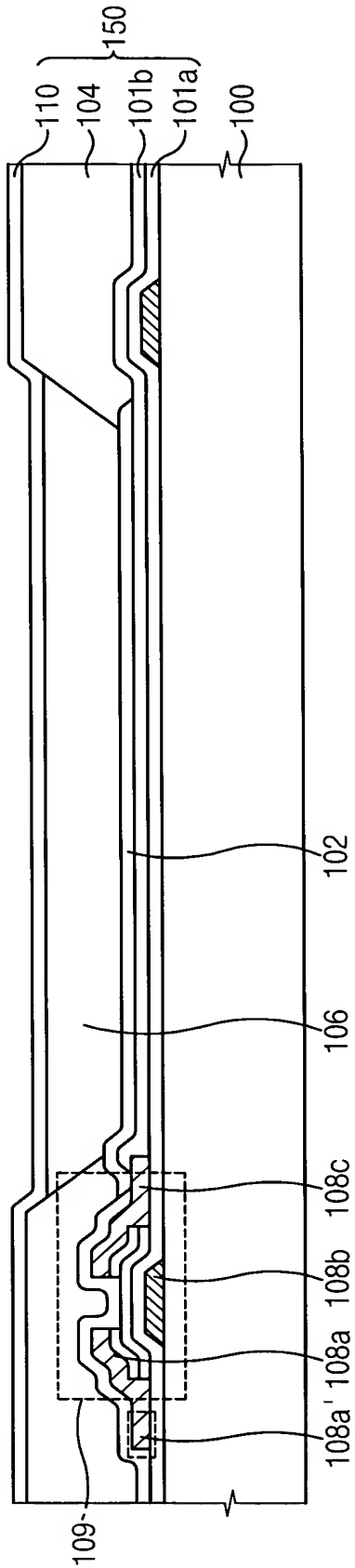
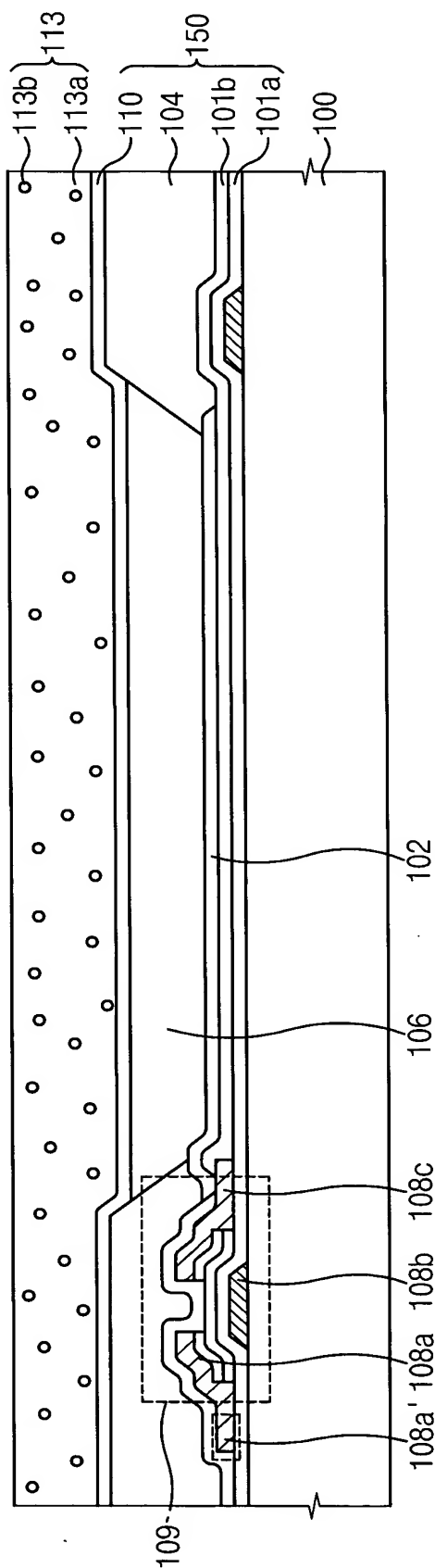
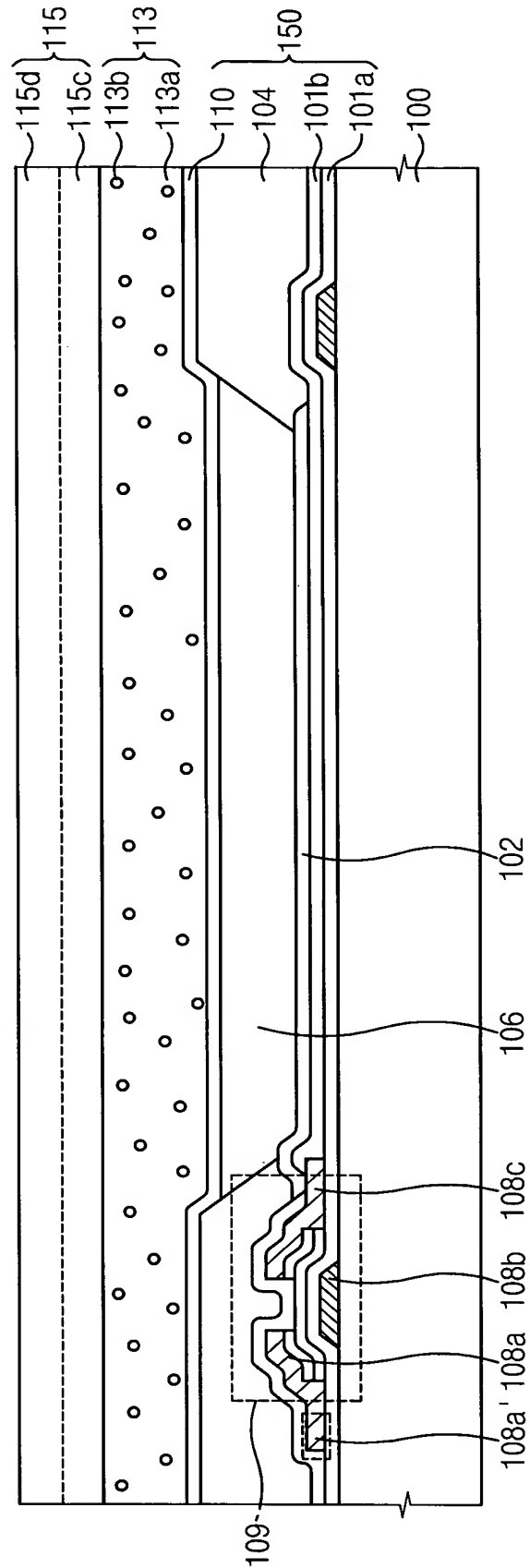


FIG. 26



This cross-sectional view shows a multi-layered structure. At the top, there is a layer 100 containing a series of small circles 102. Below this is a layer 104, which is part of a stack 110. Layer 104 contains a series of small circles 106. Below layer 104 is a layer 101b, which is part of a stack 150. Layer 101b contains a series of small circles 108a, 108b, and 108c. Below layer 101b is a layer 101a, which is also part of stack 150. Layer 101a contains a series of small circles 108a, 108b, and 108c. Below layer 101a is a layer 109, which is part of a stack 113. Layer 109 contains a series of small circles 108a, 108b, and 108c. Below layer 109 is a layer 110, which is part of a stack 113. Layer 110 contains a series of small circles 108a, 108b, and 108c. Below layer 110 is a layer 113a, which is part of a stack 113. Layer 113a contains a series of small circles 108a, 108b, and 108c. Below layer 113a is a layer 113b, which is part of a stack 113. Layer 113b contains a series of small circles 108a, 108b, and 108c. Below layer 113b is a layer 113c, which is part of a stack 113. Layer 113c contains a series of small circles 108a, 108b, and 108c. The entire structure is shown in a cross-sectional view with various layers and components labeled.

FIG. 28



This cross-sectional view shows a semiconductor device. A porous layer 100 is located at the top, containing a first porous region 113a and a second porous region 113b. Below the porous layer is a trench structure 104. The trench structure includes a trench bottom 101a and a trench side 101b. A layer 110 is formed on the trench side 101b. A layer 150 is formed on the trench bottom 101a. A layer 102 is formed on the trench side 101b. A layer 106 is formed on the trench bottom 101a. A layer 108a is formed on the trench side 101b. A layer 108b is formed on the trench bottom 101a. A layer 108c is formed on the trench side 101b. A layer 109 is formed on the trench bottom 101a. A dashed line 109 indicates a boundary between the porous layer 100 and the trench structure 104.

FIG. 30

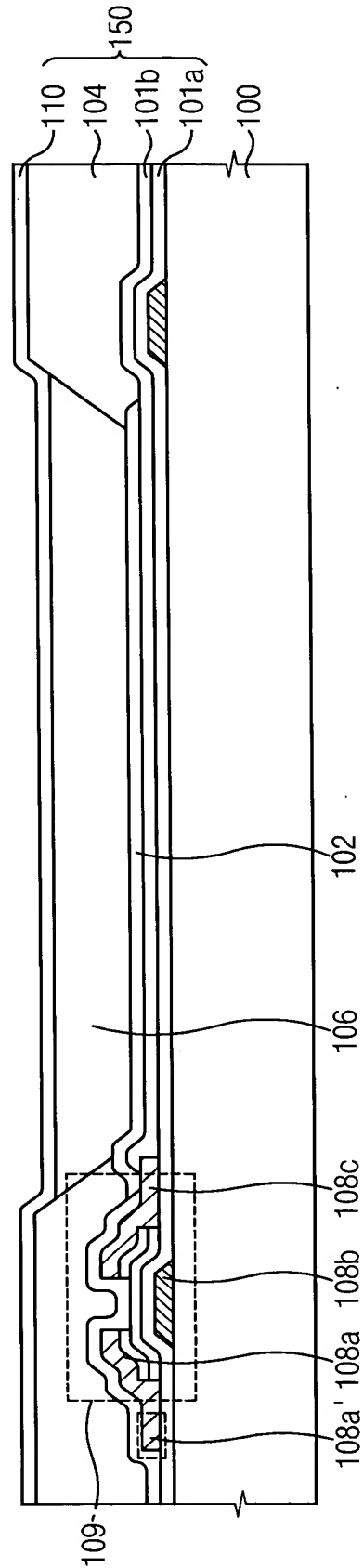


FIG. 31

